NON-PUBLIC?: N
ACCESSION #: 8905110063
LICENSEE EVENT REPORT (LER)

FACILITY NAME: South Texas, Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000499

TITLE: Reactor Trip and Loss of Offsite Power to Incorrect Protective Relay Wiring
EVENT DATE: 04/05/89 LER #: 89-009-00 REPORT DATE: 05/05/89

OPERATING MODE: 1 POWER LEVEL: 011

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Charles Ayala - Supervising Licensing Power TELEPHONE: (512) 972-8628

COMPONENT FAILURE DESCRIPTION:
CAUSE: A SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 5, 1989, Unit 2 was in Mode 1 at 11 percent power performing initial synchronization to the grid. At 0729 hours, approximately four seconds after closure of the generator breaker, a reactor trip and loss of offsite power on the auxiliary busses and the 4.16kV Train A Engineered Safety Features bus occurred. Once the plant stabilized, offsite power was restored. Reactor Coolant Pump 2D restarted immediately because its breaker failed to trip when power was lost. This resulted in actuation of Auxiliary Feedwater. The cause of this event was improper installation of a wiring change to the generator protective relaying by startup technicians prior to system turnover to plant operations. The cause of the inadvertent RCP 2D restart was a broken lug in the trip circuit due to its associated wire catching on the breaker enclosure when the breaker was racked in last. Corrective actions include correction of the generator protective relay wiring, testing of other protective circuitry, replacement of the RCP 2D breaker lug and checking the other Unit 2 RCP breakers.

NL.LER89009.U2

END OF ABSTRACT

DESCRIPTION OF OCCURRENCE:

At 0729 hours on April 5, 1989 Unit 2 was in Mode 1 at 11% power. While performing initial synchronization of the main generator to the grid, a reactor trip occurred due to loss of power to Reactor Coolant Pumps (RCP) 2A, 2B, 2C, and 2D. The loss of power occurred, approximately 4 seconds after the main generator circuit breaker was closed, due to actuation of the breaker pole failure relay (61/G1). This resulted in a trip of two 345 kV switchyard breakers, the generator circuit breaker, the generator exciter field breaker, the generator voltage regulator, the main turbine, and the 13.8kV feeder breakers to auxiliary buses 2F, 2G, 2H, and 2J. The tie breaker to 13.8kV standby bus 2F from auxiliary bus 2F opened, deenergizing standby bus 2F and 4.16kV Engineered Safety Features (ESF) bus E2A.

The loss of power to 13.8kV auxiliary buses 2F, 2G, 2H, and 2J resulted in a loss of power to Reactor Coolant Pumps 2A, 2B, 2C, and 2D. The undervoltage coils on the pump breakers actuated to trip the breakers and generate a low flow reactor trip signal through the Solid State Protection System, which tripped the reactor. All rods inserted normally, however, the Digital Rod Position Indication had lost power and could not be used to verify all rods were bottomed, so action was taken to borate the reactor coolant. The loss of power to ESF bus E2A caused Standby Diesel Generator 21 to start. ESF loads sequenced onto the bus as required. After verifying stable conditions, the operators reenergized the auxiliary buses from their respective standby buses which were supplied from the Unit 2 Standby Transformer. When bus 2J was reenergized RCP 2D restarted because its breaker had failed to trip open on the loss of voltage. The additional flow caused a drop in steam generator water level resulting in an actuation of the Auxiliary Feedwater system. Average coolant temperature continued to decrease due to lack of decay heat, lack of coolant pump heat, and secondary steam loads, so a main steam isolation was manually initiated to prevent overcooling of the RCS. The non-ESF Balance of Plant (BOP) diesel generator failed to start automatically and could not be started manually. The Technical Support Center (TSC) diesel generator was out of service for maintenance. As a result, loads supplied from these diesel generators were not restored until the auxiliary buses were reenergized. 4.16kv ESF busses E2B (Train B) and E2C (Train C) remained energized throughout this event.

With the plant in a stable condition in Mode 3, troubleshooting was performed to locate the cause of the generator breaker trip. Investigation determined that a jumper was missing between two terminals of generator backup distance

relay (21/G1) in the generator protection circuit which resulted in an open circuit on the phase C current transformer of the protection circuit. Sensing no current in phase C, the breaker pole failure relay actuated, causing actuation of the generator lockout relay. An additional wiring error on another relay in the generator protection circuit was discovered. This wiring error on the negative phase sequence relay (46/G1) would probably also have caused a generator lockout if the
aster-acting pole failure relay had not
actuated.

DESCRIPTION OF OCCURRENCE Cont'd:

Troubleshooting of the RCP 2D breaker revealed a broken lug on a cable from the undervoltage coil to the breaker trip circuit. The undervoltage coil functioned properly and sent a trip signal to the Solid State Protection System to initiate a reactor trip, however, the RCP breaker did not trip due to the broken lug.

The generator protection circuit was wired properly and tested to verify proper operation and the RCP 2D circuit breaker wiring was repaired and retested satisfactorily. Unit 2 restart was authorized at 0937 hours on April 8, 1989.

CAUSE OF OCCURRENCE:

The cause of this event was improper implementation of changes to the wiring of the generator backup distance relay (21/G1) and negative phase sequence relay (46/G1) by startup technicians prior to turnover of the generator system to Plant Operations.

Failure of the RCP 2D breaker to open on loss of voltage was caused by a failed lug in the breaker trip circuit. The wire connected to the lug caught on the breaker enclosure when it was last racked in and broke the lug. This wire had fallen out of its harness into the path of the breaker.

No cause was found for the BOP diesel generator failure to start. Subsequent starts were performed successfully and no additional troubleshooting was performed.

ANALYSIS OF EVENT:

Unplanned Reactor Protection System actuation is reportable under

10CFR50.73(a)(2)(iv). The reactor tripped as required and all safety-related equipment operated as expected. No unexpected post trip transients occurred and there was no safety injection actuation. There were no adverse radiological or safety consequences as a result of this event.

CORRECTIVE ACTION:

The generator protective relaying has been rewired and tested to ensure proper operation of the generator breaker. Additional testing was performed on the generator circuit breaker and on other current transformers associated with the protection and metering circuits to verify proper operation. No other problems were noted.

The broken lug on the RCP 2D breaker has been replaced and the other Unit 2 RCP breakers have been checked for other wires which may have fallen from their harnesses.

ADDITIONAL INFORMATION:

There have been no previous similar events reported regarding improper protective relay wiring.

The Light
Company PO. Box 1700 Houston, Texas 77001 (713) 228-9211
Houston Lighting & Power

May 5, 1989
ST-HL-AE-3088
File No.: G26
10CFR50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project Electric Generating Station
Unit 2
Docket No. STN 50-499

Licensee Event Report 89-009 Regarding Reactor Trip and
Loss of Offsite Power Due to Incorrect Protective Relay Wiring

Pursuant to 10CFRR50.73, Houston Lighting & Power (HL&P) submits the attached Licensee Event Report 89-009 regarding a reactor trip and loss of offsite power due to incorrect wiring of protective relays. This event did not have any adverse impact on the health and safety of the public.

If you should have any questions on this matter, please contact Mr. C. A. Ayala at (512) 972-8628.

G. E. Vaughn
Vice President
Nuclear Operations

GEV/BEM/km

Attachment: LER 89-009

NL.LER89009.U2 A Subsidiary of Houston Industries Incorporated Revised

ATTACHMENT 1 TO 8905110063 PAGE 2 OF 2

Houston Lighting & Power Company

ST-HL-AE-3088
File No.: G26
10CFR50.73

cc:

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